



PINEAPPLE RESEARCH INSTITUTE
of Hawaii

POST OFFICE BOX 3166
HONOLULU 2, HAWAII

April 12, 1954

Professor Joshua Lederberg
Department of Genetics
University of Wisconsin
Madison 6, Wisconsin

Dear Professor Lederberg:

I have your card requesting the separate which I am sending under separate cover together with two others, one from the Botanical Review which summarizes recent literature and one which concerns itself with a discussion of biological strains and symbiosis. The species is not a leafhopper, by the way, but a mealybug.

Since these have been written I have other unpublished information which indicates that the rod-like symbionts found in some strains are universally associated with green-spotting in South America. There is, however, no relationship between the symbionts of these insects and mealybugs of pineapple which is a separate and distinct disease. My personal conclusions following the examination of a great many specimens from South America during a six months visit there and later in Ceylon, has convinced me that Pseudococcus brevipes, like some other mealybug species, includes in the taxonomic concept of the species a great many biological strains. I believe it is possible that these biological strains, indistinguishable by any currently understood morphological criterion, have arisen by mutation of the symbionts. I would go even further and say they might have arisen by the mutation of the auxiliary symbionts. In all the mycetomes that I have examined, there appears to be one common inclusion in the mycetocytes which I have called "common" symbionts. The bacterial symbiont which is very easily demonstrated in typical green-spotting in Hawaii is found among the common symbionts in the mycetocytes and sometimes appears to dominate the internal situation by virtue of its predominance. In the non-green-spotting strain in Hawaii and quite often seen in non-green-spotting mealybugs from grass roots in other places, some coccus forms can be seen. Rarely in Hawaii one finds a different type of bacterium, much more narrow than the typical one, which may well be another strain but I have not yet found a colony in which it was found generally so have been unable to prove this by breeding. With extended experience over the tropical world, my original statements that there was probably a causal connection between bacterium and green-spotting have had to be withdrawn but the concept of the relationship between specific symbionts and specific biological strains

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of mealybug has been very greatly strengthened at the same time. I wish some cytogeneticist would tackle this problem sometime and hope that your inquiry is an index of your own interest in the matter.

Sincerely yours,



Walter Carter
Head, Entomology Department

P.S. I was shocked to read that Hoskins had passed away so young and that his wife Margaret died last year. I knew them both as fellow students at the University of Alberta but had seen neither of them since 1921.